

cord and membranes are stretched. Probably cord and membranes are equally affected. The prolongations of the dura mater afford the means of extension and counter-extension. The nerves and the brain are but little affected by the flexing of the spine. On the other hand, a considerable stretching of the nerves will produce a degree of tension in the cord even when the spine is in its usual position. The effect of such nerve-stretching is variable. But if the cord be already put on the stretch, through flexing of the vertebral column, then stretching the previously exposed sciatics, or even the bloodless stretching of the latter, produces a much greater effect on the cord. In this case the effect of the nerve stretching reaches, though to a lessened degree, to the highest part of the cord, and perhaps also to the brain.

The author believes it would be well to test the value of stretching of the cord as a therapeutic measure in disease. He thinks it would at least be justifiable to try it in those cases where nerve-stretching has hitherto been tried. The object of such treatment would be to set up a curative action through changes in the nutrition, circulation, or function of a part.

The manner of operating suggested is as follows. The force may be applied especially to the upper or lower part of the spine, according as we wish to cause a greater stretching of the upper or lower part of the cord.

In the first instance, the patient being seated on the table with the knees extended, the head and breast will be forcibly flexed toward the lower extremities. To this forcible extension of the spine may now be added the bloodless stretching of the sciatic nerves, through flexing the legs strongly at the hip-joints, the knees being still held in an extended position.

In the second instance, the force is applied directly to the lower part of the spine. The patient lies flat on the back. The knees being extended, the legs will be lifted toward the breast until the hip-joints are strongly flexed.

It may be necessary to practise these procedures some time before succeeding in producing sufficient extension to be of practical consequence. Very great extension is probably not without danger.

PHILIP ZENNER, M.D.

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*b.—PHYSIOLOGY OF THE NERVOUS SYSTEM.*

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THE FUNCTIONS OF THE CEREBELLUM.—Prof. Luciani has made a series of experiments upon this subject. The animals used were dogs. He kept alive a dog for eight months in which he had almost completely removed the cerebellum.

At the post-mortem the flocculi, the truncated peduncles, and the degenerated remains of the inferior vermicular process were the only portions to be seen. There were three periods in the phenomena presented by this animal. Immediately after the operation there was inco-ordination of all the voluntary move-

ments, so that the animal could not stand, walk, swim, or feed itself. Every attempt to move threw the anterior limbs into a state of tonic extension, and caused strong contraction of the extensors of the vertebral column, and of the head, with tendency to fall backward. These symptoms are ascribed by Prof. L. to irritation arising from the injury, not to the loss of the cerebellum.

About two months after the operation, the second period of the phenomena began and lasted about four months. The incoordination disappeared altogether in swimming, and a special form of ataxy showed itself in standing, walking, and isolated voluntary acts. The muscular movements lacked steadiness and force, and there was a constant clonic motion, but not so much as to prevent the performance even of intentional acts. When the power of walking was first regained, the animal would fall after a few steps. Later a fall was avoided by spreading out the paws. The essential condition in the cerebellar ataxy appeared to be lack of tone and deficient muscular energy. The third period, lasting about two months, was characterized by nutritive disturbances, as suppurative inflammation of the middle and external ear on both sides, with catarrhal conjunctivitis, due, in part at any rate, to external irritants. Rapid failure of nutrition ensued, at the end marasmus. After death all the remaining portions of the nervous system were found to be perfectly normal. In another dog he removed the right half of the cerebellum. Afterward he extirpated the sigmoid gyri. After this operation the left half of the cerebellum was removed. The extirpation of the sigmoid gyri caused a greater amount of paresis of all the limbs than occurs from the same cause in dogs having the cerebellum uninjured. From these facts Prof. Luciani draws the conclusion that the cerebellum does not lie in the path of the centrifugal fibres from the brain to the spinal cord, that the incoordination is due to the irritation of the peduncles, and that the ataxy represents the disorder due to loss of the cerebellum, that the function of the cerebellum is not to co-ordinate movements, whether coordination be understood as an elaboration of voluntary impulses, or as a reflex muscular adaptation. According to him the cerebellum "is a central organ on which depend the tone and a great part of the disposable nervous energy of the motor elements of the muscles." He also discovered that each half of the cerebellum influences both sides of the body. Prof. Luciani holds that the cerebellum is an organ, physiologically one, that it is not, as Ferrier holds, a complex of several organs.—*London Med. Record*, June 16, 1884.

SECONDARY DEGENERATION OF NERVE-TRACTS FOLLOWING REMOVAL OF THE CORTEX OF THE CEREBRUM IN THE DOG.—Messrs. Langley and Sherrington have made an examination of the nerve-tracts in the dog of Prof. Goltz. The extent of removal of the cortex is detailed in a previous number of the JOURNAL. In this dog the cortex of the cerebral hemispheres had been removed

unequally on the two sides and at different dates, and they hoped that a comparison of the degeneration on the two sides of the cord might lead to some conclusion as to whether removal of particular portions of the cortex caused degeneration of particular parts of the lateral pyramidal tract of the spinal cord. It also seemed desirable to determine whether secondary degeneration had occurred in all parts of the crista and pyramids, or in certain parts only. In the crista above the pons, most of the bundles of nerve-fibres showed marked signs of degeneration, although there were many normal nerve-fibres throughout. No distinct degeneration was seen in the mesial or meso-ventral bundles. In man lesions of the motor area of the cortex are commonly described as causing degeneration in, roughly speaking, the central part of the crista. A comparison, then, of the degeneration occurring in the dog with that occurring in other animals after injury to the cortex, renders it probable that the mesial, central, and lateral parts of the crista, so far as they are in trophic connection with the cortex at all, are connected respectively with its anterior, middle, and posterior portions. In a transverse section carried through the anterior portion of the pons, the number of normal nerve-fibres in the crista was much less both relatively and absolutely than in the previous section above the pons. This confirms the description of Flechsig and others that the mesial bundles of the crista are not continued downward in the anterior pyramid.

Their results were mainly as follows : In the crista just above the pons, the lateral and central portions were partially degenerated ; the mesial and meso-ventral portions were normal or nearly normal. Probably the mesial, central, and lateral portions of the crista are connected respectively with the suborbital lobe, the sigmoid gyrus and adjoining region, and some part of the cortex posterior to the sigmoid gyrus. The whole of the right anterior pyramid was markedly sclerosed ; the mesial portion being least, the ventral portion most, sclerosed. The subolivary tract was normal ; it cannot then be in direct continuation with the dorsal part of the crista ; in the decussation its fibres become placed lateral to the pyramidal fibres ; the two sets cross over together throughout or nearly throughout the whole region of the decussation. The transverse area of the sclerosed region diminishes considerably in passing through the pons, and in the decussation of the pyramids. The sclerosis can be traced in the lateral pyramidal tract on each side of the cord as far as the upper part of the lumbar region ; throughout the sclerosed area are many normal nerve-fibres. The patch of greatest sclerosis is on the left side of the cord, and is placed more ventrally than the patch of greatest sclerosis on the right side. Not improbably the dorsal part of the lateral pyramidal tract is connected with the cortex posterior to the sigmoid gyrus. In addition to the secondary degeneration of the sclerosed area, there is apparently a "tertiary" degeneration of some fibres of the anterior and antero-lateral columns, especially those of the median portion of the anterior columns.—*Journal of Physiology*, vol. v., No. 2.

**THE TEMPERATURE-SENSE.**—The relative sensibility to heat of the skin in different parts of the body has not yet been determined. Dr. S. Pollitzer has made several experiments upon this subject. In all previous experiments the tactile impressions are complicated with the thermal. The sensibility of a part is determined by the intensity of the smallest stimulus required to evoke a sensation. That part is the most sensitive which can appreciate the smallest quantity of heat, and to determine the relative sensibility in different parts of the body it is necessary to determine the smallest quantities of heat which the different parts can appreciate. He used as a source of heat a modified Paquelin cautery, the "button" being moved slowly toward the skin by means of a rack and pinion. In his experiments, the temperature of the source of heat is practically constant, the part examined and the heated surface itself are sheltered from accidental currents of air by the use of suitable screens, the effects of convection of currents of heated air are entirely eliminated by having the heated surface always vertical over the part examined, the thermal sensations are uncomplicated by any sensations of touch, the parts of the skin examined are always of exactly the same extent of surface. Though absolute reliance cannot of course be placed on the result of observations on half a dozen individuals, the following conclusions are given :

(1) The relative sensitiveness to heat in different parts of the body is not the same in different individuals. (2) It differs much less in different parts of the same individuals than the sensitiveness to pressure or power of localization, the greatest difference for heat being as three to one, while for pressure it is at least as five to one, and for localization as sixty to one. (3) The parts in which the other cutaneous senses are most acute are not the same as those in which there is greatest sensitiveness to heat. (4) Of the parts examined, the tip of the index finger is the least sensitive; in the other parts, where the sense of locality is from five to thirty times as dull, the thermal sense is two or three times as acute. (5) The thermal sensitiveness bears no definite relation to the thickness of the epidermis. He also discovered why the back of the hand has been generally regarded as more sensitive to heat than the palm, because a thermal stimulus will give rise to a sensation sooner in it. He also explains that when the hand is immersed in warm water its dorsum is first affected, but after a while the palm feels hotter. It is because though the latent period of the palm is greater, its sensitiveness is also greater, than that of the back of the hand. It takes the stimulus longer to affect the palm, but when it does reach the temperature organ it affects it the more powerfully.—*Journal of Physiology*, vol. v., No. 3.

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**THE CEREBRAL CIRCULATION.**—Under the direction of Prof. Morselli, Drs. Bergesio and G. Musso have made experiments upon a patient who had lost a portion of his skull. They used the

method proposed by Mosso, and studied the effect of drugs upon the brain.

Morphia and alcohol caused cerebral congestion. Paraldehyde was followed by an anaemia of the brain.

These agents do not cause sleep by any effect upon the cerebral circulation.—*Lo Sperimentale*, Tomo liv., Fascicolo 9, 1884.

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**ELECTRICAL OLFACTION.**—Herr Aronsohn has made a series of experiments upon this point. He filled the nose with an indifferent fluid, and conducted through it to the olfactory nerve a constant current of small intensity, one electrode being inserted into the nostril, and the other on the brow. The most suitable fluid was a 73-per-cent solution of chloride of sodium warmed to about  $38^{\circ}$  C. He found that olfaction occurred only by variations in the current, sometimes by closure, and at other times by the opening, of the current. The reaction-laws of the olfactory nerve are as follows :

1. The kathode-olfaction ensues only by closing of the current, not by the opening.
2. Anode-olfaction occurs only by the opening of the current, not by the closing.
3. Anode-olfaction by the opening of the current ensues the stronger the current and the longer it is turned on.
4. The reaction corresponding to the anode is, other things being equal, weaker than that of the kathode.
5. The olfaction caused by the opening of the anode disappears through closing of the anode.
6. The reaction of both anode and kathode increases with the strength of the current.

The quality of the olfaction does not depend on the direction of the current. The laws of the olfactory nerve coincide nearly completely with those of the acoustic, and with the contraction-laws of motor nerves as described by Pflüger.—*DuBois' Archiv.*, 1884, 4 and 5 Heft.

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**THE RELATION OF THE NERVES OF THE SKIN TO RESPIRATION.**—Herr F. Falk has studied the effect of thermic irritation, ducking, and of cold affusion upon the movements of respiration. He recommends that in cases of asphyxia the cold affusions, to be of use, should be applied to the breast, or better, to the neck. Cold applications to the breast show that either directly or through vaso-motor influences the heart is excited into considerable activity. To demonstrate the action on the heart he used an acupuncture-needle, and these conclusions are from experiments on asphyxiated animals. The action on the heart is especially marked, the more the coverings of the chest, as skin and muscles, are removed before the affusion. Cold applications to the neck act best upon the respiration. They produce an inspiration, and

this is more marked when the soft coverings of the skull are previously removed, for the irritation of the medulla oblongata is more intense.—*DuBois' Archiv.*, 1884, 4 and 5 Heft.

ISAAC OTT, M.D.

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c.—GENERAL PATHOLOGY OF THE NERVOUS SYSTEM.

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KAKKÉ : A DISEASE OF JAPAN.—Dr. Theobald A. Palm, in a thesis presented to the University of Edinburgh, has made an interesting study of the above-named disease, of which we present a summary from the *Edinburgh Clinical and Pathological Journal*, three numbers of which are almost entirely devoted to it. The resemblance of the disease to beri-beri, and to the cases of multiple neuritis reported by several foreign observers, and also more recently by Dr. S. G. Webber, of Boston, (see "Trans. Am. Neurological Association, '84, July No. of the JOURNAL,) make it a subject of interest to neurologists. Of the cases observed by Dr. Palm many presented the following symptoms : "They complained of numbness in the lower extremities, which they generally described as a feeling as if a thin tissue paper were spread over the skin, of slight loss of power in the legs, showing itself by inability to walk any distance without inordinate fatigue, a tendency to stumble and for the knees to give way. They experienced a difficulty especially in going up stairs, and sometimes in holding the thong of the wooden clog usually worn by the Japanese, which passes between the great toe and the next. Some patients drop the foot in walking, showing a paralysis or paresis of the flexors of the foot and extensors of the toes. When the foot was planted evenly on the floor they had little or no power to raise the toes from the ground, or if they could raise the toes, little force was required to press them down. They had also a trace of oedema over the tibiæ or about the ankles. In many cases there was tenderness of the muscles of the calf, which were in some instances hard and swollen, in other cases abnormally flabby and apparently partially atrophied. In almost all of these patients there was an absence or marked diminution of tendon reflex at the knee. Beyond the above symptoms they seemed to be in average good health. Some of them complained of vague, dull pains in the legs. \* \* \* In the majority of cases the symptoms are not confined to the lower extremities. Numbness occurs in other parts, most frequently in the finger-tips, the hands, and forearms, and this is accompanied by some loss of motor power in the hands. The slightest degree of anaesthesia may occur in the abdomen or face. Edema may also appear in the face. Palpitation of the heart occurs upon slight exertion, or palpitation of the abdominal aorta, and there may be the appearance of serious illness with pallor, or the patient may appear in normal health." The cases are generally chronic, many having previously suffered from the same disease. Their